

CENSUS BULLETIN.

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AGRICULTURE.

HAWAII.

Hon. WILLIAM R. MERRIAM,

Director of the Census.

SIR: I have the honor to transmit herewith, for publication in bulletin form, the statistics of agriculture for the territory of Hawaii, taken in accordance with the provisions of section 7 of the act of March 3, 1899. This section requires that—

The schedules relating to agriculture shall comprehend the following topics: Name of occupant of each farm, color of occupant, tenure, acreage, value of farm and improvements, acreage of different products, and number and value of live stock. All questions as to quantity and value of crops shall relate to the year ending December thirty-first next preceding the enumeration.

A "farm," as defined by the Twelfth Census, includes all the land, under one management, used for raising crops and pasturing live stock, with the wood lots, swamps, meadows, etc., connected therewith. It also includes the house in which the farmer resides, and all other buildings used by him in connection with his farming operations.

The census of agriculture in Hawaii was taken in the summer of 1900 by a corps of special agents, under the direction of Hon. Alatau T. Atkinson, of Honolulu, special agent in charge of the enumeration of the population. The figures presented in this bulletin comprise the first statistics of agriculture in Hawaii secured by a United States Census.

The farms of Hawaii, June 1, 1900, numbered 2,273, and were valued at \$60,029,956. Of this amount, \$3,545,895, or 5.9 per cent, represents the value of buildings, and \$56,484,061, or 94.1 per cent, the value of land and improvements other than buildings. On the same date the value of farm implements and machinery was \$11,484,890, and of live stock, \$2,570,142. These values, added to that of farms, give the "total value of farm property," \$74,084,988, an average agricultural investment per inhabitant of \$481.07.

The products derived from domestic animals, poultry, and bees, including animals sold and animals slaughtered

on farms, are referred to in this bulletin as "animal products." The total value of such products, together with the value of all crops, is termed "total value of farm products." This value for the census year was \$22,040,731, an average of \$143.12 for each inhabitant of the islands. Of the above amount, \$623,215, or 2.8 per cent, represents the value of animal products, and \$21,417,516, or 97.2 per cent, the value of crops, including forest products cut or produced on farms.

The value of "all farm products," as here given, represents substantially the value of "net farm products," defined by the census as the amount obtained by deducting from the "total value of farm products" the value of the products fed to live stock on the farms of the producers. In Hawaii products are so seldom fed to stock on the farms of the actual producers, that no reports of such feeding were submitted.

As no reports of expenditures for taxes, interest, insurance, feed for stock, and similar items have been obtained, no statement of net farm income can be given.

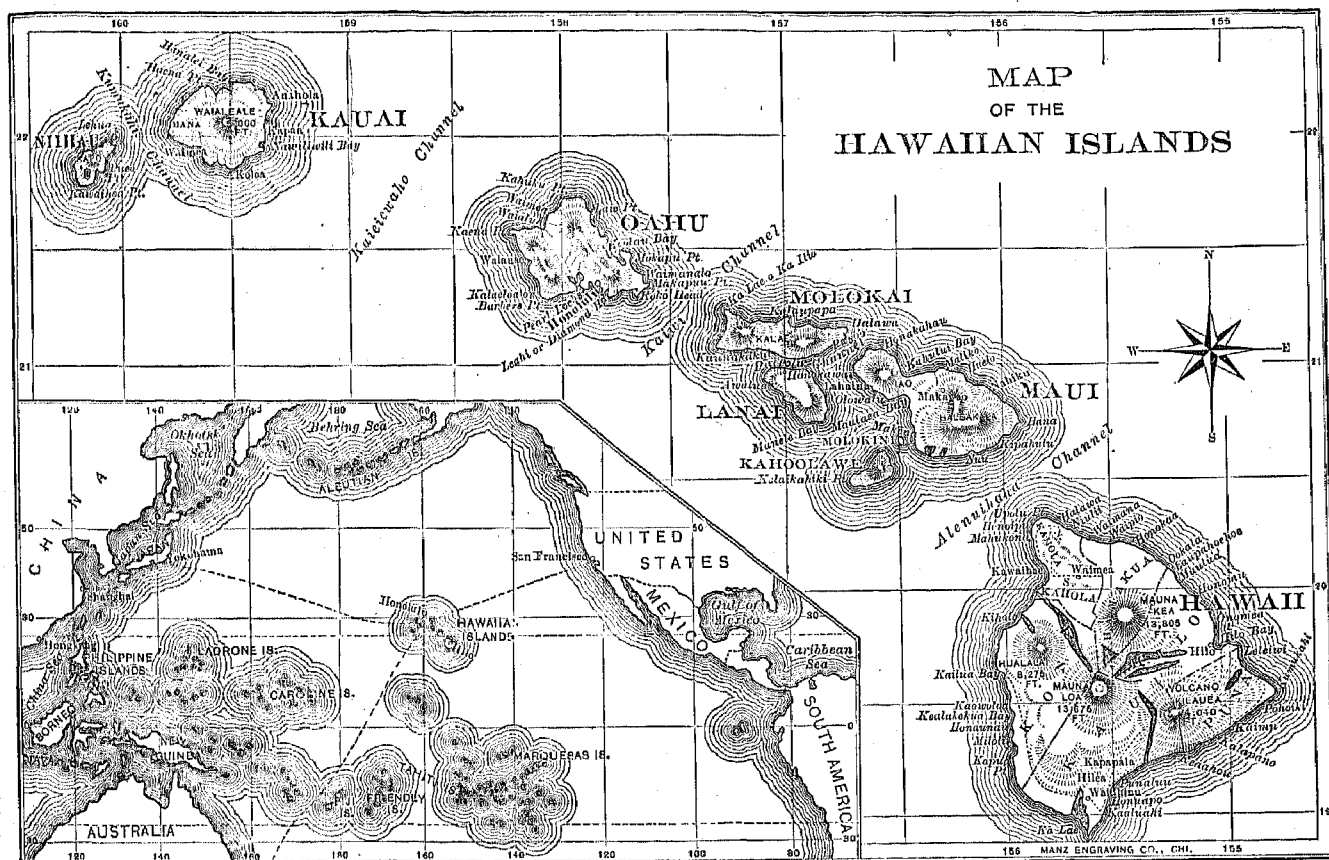
The length of time required in the transmission of mails to and from the islands, made impracticable any extensive correspondence on the subject of irrigation upon which a detailed treatment might have been based. The importance of irrigation as a factor in the agricultural development of the islands, however, has been plainly set forth in the discussion and tables which conclude the bulletin.

There is included in this bulletin, a map of the Hawaiian Islands, for the use of which we are indebted to the United States Department of Agriculture. The map, it is believed, will be helpful in locating the island districts and other territorial divisions herein mentioned.

Very respectfully,

L. G. Powers.

Chief Statistician for Agriculture.



AGRICULTURE IN HAWAII

GENERAL STATISTICS.

In accordance with the provisions of an act of Congress approved April 30, 1900, the Hawaiian Islands, originally acquired by the United States under the act of Congress approved July 7, 1898, became a territory of the United States, June 14, 1900, with the name "Territory of Hawaii."

The territory of Hawaii consists of a group of 20 islands which lie in the North Pacific Ocean, 2,100 miles from San Francisco to the south and west and more than 2,000 miles from the nearest mainland. The main islands of the group form a chain, running from northwest to southeast, and extending over a distance of 890 miles from the westernmost point of Niihau to the eastern extremity of the island of Hawaii. It lies within longitude 154° 40' and 160° 30' west, and latitude 22° 16' and 18° 55' north.

The islands comprised in the territory are as follows: Hawaii, Maui, Oahu, Kauai, Molokai, Lanai, Niihau, Kahoolawe, Kaula, Molokini, Lehua, Bird, Necker, Johnson, Laysan, Laysan, Laysan, Ocean, Midway, Pearl Reef, and French Frigate Shoal. Of these, only the 7 first named are inhabited. A few shepherds formerly resided upon the island of Kahoolawe, and kept large flocks of sheep upon the 30,000 acres of grazing land which the island afforded. With the exhaustion of the pasturage the shepherds left, and at the date of the census enumeration in 1900 the island was uninhabited. Since that time plans have been formulated for introducing hardy grasses, with a view of reestablishing sheep ranches. The other 12 islands are mere rocks and coral reefs, which workmen occasionally visit for the purpose of collecting eggs and the guano deposits which are found there in great abundance.

According to recent measurements made by the United States Coast Survey, the land surface of the territory, exclusive of the 12 uninhabitable islands, comprises 5,538.1 square miles. Hawaii, the largest of the group and the second in point of population, has an area of 4,004 square miles. Occupying a vast area in the central portion of the island, are the three great volcanoes, Mauna Kea, Mauna Loa, and Hualalai, ranging in height from 13,805 feet to 8,275 feet. Although the presence of these three volcanoes and their vast fields of lava-flow render barren the major portion of its land surface, Hawaii leads all other islands of the group in richness and diversity of soil and in wealth of resources. More than forty per cent of the sugar production of the territory in 1899 came from this island's fertile cane fields, while some of the finest coffees to be found are grown in the districts of Kona and Kamakua.

Second in size is the island of Maui, with an area of 721.9 square miles. Its land surface, like that of the

island of Hawaii, is to a large extent untillable, owing to the presence of 2 mountain ranges. The larger range contains one of the world's greatest extinct volcanoes, Haleakala, which rises to an elevation of 10,032 feet above the level of the sea. The fertile valleys between these mountains, and the arable levels at their outside bases, afford some of the most productive areas in the group, sugar culture and stock raising being the most extensive industries.

Third in size, but first in productiveness per acre, is the island of Oahu, which has an area of 597.8 square miles. Honolulu, the capital of the territory, and the principal seaport of the group, is located upon the southern coast of this island.

The areas in square miles of the remaining islands are as follows: Kauai 595.4, Molokai 257.8, Lanai 173.6, Niihau 104.5, and Kahoolawe 83.1. Lanai and Niihau are given over almost entirely to grazing, thousands of horses, sheep, goats, and cattle feeding upon their grassy levels. Upon the island of Molokai is located the government hospital for lepers, established in 1870. This institution is situated upon a tract of about 8,300 acres, occupying a projection on the north shore. Owing to its precipitous heights and the general rocky nature of the surface, there is but little farming done on the island. The raising of live stock and the cultivation of taro receive the greatest attention. An attempt made by the American Sugar Company to establish an extensive plantation in the lowlands along the southern shore, has proven a costly, and as yet an unsuccessful, experiment. Many thousands of dollars were expended during 1899, and subsequently, in the prosecution of the enterprise, but the failure to secure an adequate supply of fresh water for irrigation purposes caused the abandonment of the project.

Geologically the island group is of volcanic origin and of comparatively recent formation. The soil is composed almost wholly of basaltic lavas in various stages of decomposition. The most important islands contain large areas of very fertile land, the most productive being the lowlands where the soil, sedimentary in its nature, has been deposited to great depths by the action of the rainfall. This fertility of the soil is associated with the most favorable climatic conditions, and as a result the agricultural possibilities of the islands are nowhere surpassed in so limited an area.

NUMBER AND SIZE OF FARMS.

The following table gives the number of farms, the total, improved, and unimproved acreages, and the per cent of farm land improved.

TABLE 1.—FARMS AND FARM ACREAGE: 1900.

YEAR.	Number of farms.	NUMBER OF ACRES IN FARMS.				Per cent of farm land improved.
		Total.	Improved.	Unimproved.		
				Forest land.	Pasture land. ¹	
1900 ² -----	2, 273	2, 609, 613	294, 545	717, 764	1, 597, 304	11.3

¹The pasture land reported consists for the most part of grazing areas which never have been put under the plow, and is, therefore, classed with the unimproved land.

²No complete statistics of farms or farm areas were secured prior to 1900.

The number of farms in 1900 was 2,273, of which 2,111, or 92.9 per cent, reported buildings. The total area in farms, 2,609,613 acres, comprises 62.4 per cent of the total land surface of the 8 principal islands, distributed as follows: 38.2 per cent in pasturage, 17.2 per cent in forest area, and 7.0 per cent in improved land. Considerably less than one-third of the improved land is devoted to crops, so that only about two per cent of the total land surface is under cultivation.

The average area of the farms was 1,148.1 acres. The

large holdings of the sugar planters, together with extensive sheep ranches, account for this large average. There are many small agricultural holdings in the islands, however, especially among the farms operated by tenants.

It is probable that the number of farms and also the acreage of farm land have been steadily increasing, as in recent years thousands of acres of pasture land have been utilized for growing sugar cane, and many marshes have been reclaimed for the cultivation of rice.

Some of the larger farms contain great tracts of lava and other waste lands, which were, as a rule, included by the enumerators under the head of forest lands, as they could not properly be classed either as improved land or as pasture land. In making comparisons based upon the average land values and productiveness of the different islands, account must be taken of the fact that these waste lands constitute a large percentage of the farm acreage of some islands, while in others they are very inconsiderable in extent. Consideration must be given, also, to the relative areas of cheap grazing lands, which are very extensive in some islands, and comparatively limited in others.

ISLAND STATISTICS.

Table 2 gives an exhibit of general agricultural statistics by islands.

TABLE 2.—NUMBER AND ACREAGE OF FARMS, AND VALUES OF SPECIFIED CLASSES OF FARM PROPERTY, JUNE 1, 1900, WITH VALUE OF PRODUCTS OF 1899, AND EXPENDITURES OF 1899 FOR LABOR AND FERTILIZERS, BY ISLANDS.

ISLANDS.	NUMBER OF FARMS.		ACRES IN FARMS. ¹			VALUE OF FARM PROPERTY.				Value of all products.	EXPENDITURES.	
	Total.	With buildings.	Total.	Improved.	Pasture.	Land and improvements (except buildings).	Buildings.	Implements and machinery.	Live stock.		Labor.	Fertilizers.
The Territory -----	2, 273	2, 111	2, 609, 613	294, 545	1, 597, 304	\$56, 481, 061	\$3, 545, 895	\$11, 484, 890	\$2, 570, 142	\$22, 040, 781	\$7, 913, 166	\$1, 852, 847
Hawaii -----	954	909	1, 747, 213	112, 618	1, 122, 085	16, 495, 470	1, 148, 950	2, 379, 340	1, 305, 360	8, 562, 888	2, 788, 140	591, 600
Kauai -----	399	387	236, 275	51, 888	88, 986	11, 552, 710	582, 810	2, 672, 620	328, 637	4, 854, 222	1, 778, 620	287, 910
Lanai -----	2	2	91, 960	2, 900	86, 500	692, 500	42, 500	107, 500	57, 575	29, 290	62, 650	260
Maui -----	383	312	240, 016	58, 095	124, 494	14, 468, 700	994, 920	3, 035, 510	477, 927	4, 085, 516	1, 419, 170	225, 860
Molokai -----	27	21	107, 879	536	95, 973	341, 780	36, 520	900	61, 563	51, 149	113, 690	-----
Niihau -----	1	1	60, 000	1, 000	30, 000	45, 000	5, 000	1, 000	39, 150	10, 000	3, 000	-----
Oahu -----	507	479	123, 270	37, 418	49, 266	12, 887, 901	735, 195	3, 288, 020	299, 930	4, 447, 666	1, 747, 896	214, 687

¹ Forest area may be obtained by subtracting from total the sum of improved and pasture acreage.

The island of Hawaii is the largest of the group, and also the most important from an agricultural point of view. It contains 42.0 per cent of the total number of farms in the territory, 67.0 per cent of the total area in farms, 48.4 per cent of all the improved land, and 70.2 per cent of the acreage in pasture. The value of its farm land and improvements, except buildings, constitutes 29.2 per cent of the total for the territory, and that of its live stock, 50.8 per cent of the aggregate live-stock value of the territory.

The value of the island's farm products in 1899, constituted 38.8 per cent of the total value of products for the territory, and its expenditures for labor and fertilizers constituted 35.2 per cent and 43.9 per cent, respectively, of the total expenditures for the group.

It surpasses every other island in number of farms, farm area, value of farm property, and value of products.

The island of Oahu has only about one-fifteenth the farm acreage reported for Hawaii, but has over one-half as many farms. This difference is due to the number of small rice, taro, and vegetable farms operated in the vicinity of Honolulu. With an area of but little more than one-fourth as much improved land, Oahu produced crops having a value more than half as great as was reported for Hawaii, indicating that its improved area is more intensively cultivated.

The portion of the land surface included in farms on each of the islands is as follows: Hawaii, 68.2 per cent; Kauai, 62.0 per cent; Lanai, 85.5 per cent; Maui, 51.9 per cent; Molokai, 65.4 per cent; Niihau, 89.7 per cent;

and Oahu, 32.2 per cent. The high percentages for Lanai and Niihau are accounted for by the fact that these islands are given over almost wholly to live-stock raising, there being a ranch of 90,000 acres on the former and one of 60,000 on the latter. This fact explains, also, the relatively low expenditures for labor and fertilizers on these islands.

FARM PROPERTY AND PRODUCTS.

Table 3 gives, by islands, the average size of farms, the average value per acre, the average value of farm property, the average value of crops produced, and the average expenditure per farm for labor and for fertilizers.

TABLE 3.—NUMBER OF FARMS, THEIR AVERAGE SIZE AND AVERAGE VALUE PER ACRE, TOGETHER WITH AVERAGE VALUE OF FARM PROPERTY, AVERAGE VALUE OF ALL PRODUCTS, AND AVERAGE EXPENDITURES PER FARM FOR LABOR AND FOR FERTILIZERS, BY ISLANDS.

ISLANDS.	Number of farms.	Average acreage of farms.	Average value of land per acre.	Average value per farm of farm property.	Average value per farm of all products.	AVERAGE EXPENDITURE PER FARM—	
						For labor.	For fertilizers.
The Territory	2,273	1,148.1	\$21.64	\$12,593	\$9,697	\$3,481	\$595
Hawaii	954	1,831.5	9.44	22,358	8,976	2,923	623
Kauai	399	592.2	48.89	37,337	12,166	4,458	722
Lanai	2	47,480.0	7.29	450,038	14,645	31,325	130
Maui	383	625.7	60.28	49,548	10,667	3,705	588
Molokai	27	3,995.5	3.17	16,325	1,894	4,211	—
Niihau	1	60,000.0	0.75	90,150	10,000	3,000	—
Oahu	507	243.1	104.55	33,947	8,773	3,447	483

From the above table it will be seen that the average farm of the territory contains 1,148.1 acres, valued at \$32,593, or \$21.64 per acre, and that it produced in 1899, crops and animal products valued at \$9,697, while the expenditures for labor and fertilizers amounted to \$3,481 and \$595, respectively. The average expenditure for labor is greater than the average value of products per farm in any of the states or other territories of the United States.

FARM TENURE.

Table 4 is an exhibit of farm tenure for 1900, showing the number and per cent of farms operated by owners and by tenants. Tenants are divided into two groups: "Cash tenants," who pay a rental in cash or a stated amount of labor or farm produce, and "share tenants," who pay as rental a stated share of the products. In Table 5 the tenure of farms in 1900 is given by race of farmer, and farms operated by owners are subdivided into three groups designated as farms operated by "owners," "part owners," and "managers." These groups comprise, respectively: (1) Farms operated by individuals who own all the land they cultivate; (2) farms operated by individuals who own a part of the land and lease the remainder from other parties or from the Government; and (3) farms operated by individuals who receive from the owners or lessees a fixed remuneration for their supervision and other services.

TABLE 4.—NUMBER AND PER CENT OF FARMS OF SPECIFIED TENURES, JUNE 1, 1900.

YEAR.	Total number of farms.	NUMBER OF FARMS OPERATED BY—			PER CENT OF FARMS OPERATED BY—		
		Owners. ¹	Cash tenants.	Share tenants.	Owners. ¹	Cash tenants.	Share tenants.
1900 ²	2,273	951	1,255	67	41.8	55.2	3.0

¹ Including "part owners" and "managers."

² No complete statistics of farms by tenure were secured prior to 1900.

TABLE 5.—FARMS OF SPECIFIED TENURES, JUNE 1, 1900, CLASSIFIED BY RACE OF FARMER, WITH PERCENTAGES.

PART 1.—NUMBER OF FARMS OF SPECIFIED TENURES.

RACE.	Total number of farms.	Owners.	Part owners.	Managers.	Cash tenants.	Share tenants.
The Territory	2,273	684	139	128	1,255	67
White	509	271	41	92	98	7
Hawaiian ¹	488	287	73	7	104	17
Colored ²	1,276	126	25	29	1,053	43
Hawaiian	431	259	61	5	94	12
Part Hawaiian	57	28	12	2	10	5
Chinese	742	83	20	28	589	22
Japanese	531	40	5	1	464	21
South Sea Islander	1	1	—	—	—	—
Negro	2	2	—	—	—	—

PART 2.—PER CENT OF FARMS OF SPECIFIED TENURES.

The Territory	100.0	30.1	6.1	5.6	55.2	3.0
White	100.0	53.2	8.0	18.1	19.3	1.4
Hawaiian ¹	100.0	58.8	15.0	1.4	21.3	3.5
Colored ²	100.0	9.9	1.9	2.3	82.6	3.4
Hawaiian	100.0	60.1	14.1	1.2	21.8	2.8
Chinese	100.0	11.2	2.7	3.8	79.4	2.9
Japanese	100.0	7.5	0.9	0.2	87.4	4.0

¹ Including Hawaiian and "Part Hawaiian."

² Including Chinese, Japanese, South Sea Islanders, and negroes.

No complete census as to farm tenure having been taken prior to 1900, it is impossible to show the exact increases or decreases in the number of farms of each tenure.

All available data point to the conclusion, however, that there has been an increase in every class of tenure during the past decade, and that the greatest increase in any one class has been in that of cash tenants. There has been a substantial gain also in the number of farms operated by managers, although on June 1, 1900, their number was only 128, or but 5.6 per cent of the total number of farm operators.

The different classes of farm operators are distributed among the islands as follows: Owners, Hawaii 364, Kauai 57, Maui 150, Molokai 13, and Oahu 100; part owners, Hawaii 79, Kauai 10, Lanai 1, Maui 31, Molokai 5, and Oahu 13; managers, Hawaii 49, Kauai 26, Lanai 1, Maui 19, Molokai 1, Niihau 1, and Oahu 31; cash tenants, Hawaii 434, Kauai 300, Maui 171, Molokai 2, and Oahu 348; share tenants, Hawaii 28, Kauai 6, Maui 12, Molokai 6, and Oahu 15.

Table 5, giving tenure of farmers by race, shows that whites and Hawaiians operate an approximately equal number of farms, and that "colored" farmers (mainly Chinese and Japanese) operate about two and one-half times

as many as either of the above groups singly. White and Hawaiian owners, also, are approximately equal in number, together making up about 81.5 per cent of all owners. Farms operated by cash tenants are the most numerous of any single class shown in Table 5, and are almost double the number of farms operated by owners, the class second in importance. Cash tenants are mainly "colored," 1,053, or about 84 per cent of the total number being Chinese and Japanese, with a slight preponderance of the former.

OWNERSHIP OF FARM LANDS.

Table 6 presents an exhibit, by race of farmer and by tenure, of the acreages of lands owned, lands leased from the government, and lands leased from private individuals and corporations.

TABLE 6.—NUMBER AND ACREAGE OF FARMS BY RACE AND TENURE OF FARMER, SHOWING DIVISION OF OWNED AND LEASED LAND, AND SOURCE OF LEASE-HOLD, JUNE 1, 1900, WITH PERCENTAGES.

RACE OF FARMER, AND TENURE.	Total number of farms.	NUMBER OF ACRES.			PER CENT OF ACREAGE.		
		Owned.	Leased from government.	Leased from private persons.	Owned.	Leased from government.	Leased from private persons.
The Territory.	2,273	1,126,458	849,632	633,523	43.2	32.5	24.3
White.	509	1,021,496	656,811	393,940	49.1	32.0	18.9
Hawaiian ¹	488	97,673	163,891	220,725	20.0	34.7	45.3
Colored ²	1,276	7,289	13,957	18,583	18.2	34.8	47.0
White:							
Owners.	271	222,009			100.0		
Part owners.	41	20,529	49,356	48,402	17.4	41.7	40.9
Managers.	92	778,958	617,087	337,319	44.9	35.6	19.5
Cash tenants.	98		898	7,810		4.8	95.2
Share tenants.	7			379			100.0
Hawaiian:							
Owners.	250	17,009			100.0		
Part owners.	61	4,762	5,670	5,087	30.7	36.5	32.8
Managers.	6	68,265	101,200	171,065	20.1	29.7	50.2
Cash tenants.	94		1,604	12,005		11.8	88.2
Share tenants.	12			101			100.0
Part Hawaiian:							
Owners.	28	1,054			100.0		
Part owners.	12	6,450	8,360	25,624	16.0	20.7	63.3
Managers.	2	124	52,000	6,000	0.2	89.5	10.3
Cash tenants.	10			759			100.0
Share tenants.	5			84			100.0
Chinese:							
Owners.	88	5,104			100.0		
Part owners.	20	1,260		1,628	43.0	0.1	56.9
Managers.	28	250	113	3,254	6.9	3.1	90.0
Cash tenants.	589		1,447	9,654		13.0	87.0
Share tenants.	22			803			100.0
Japanese:							
Owners.	40	508			100.0		
Part owners.	5	56		66	45.9		54.1
Managers.	1		12,000			100.0	
Cash tenants.	464		393	3,196		11.0	89.0
Share tenants.	21			257			100.0
South Sea Islander:							
Owners.	1	8			100.0		
Part owners.							
Managers.							
Cash tenants.							
Share tenants.							
Negro:							
Owners.	2	18			100.0		
Part owners.							
Managers.							
Cash tenants.							
Share tenants.							

¹Including Hawaiian and "Part Hawaiian."

²Including Chinese, Japanese, South Sea Islanders, and negroes.

In 1894 the Republic of Hawaii, by an amendment to its constitution, declared the "crown lands" of the islands to be the property of the Hawaiian Government. By the Land act of 1895, these lands were consolidated with those which had previously been known as "government lands" under the general designation of "public lands." Of these

original "crown lands" there remain 920,583 acres, and of the "government lands" 789,552 acres, making a total of 1,710,115 acres, valued at \$3,480,400, now classed as "public land." According to the report of the governor of Hawaii for 1901, only 1,371,232 acres are now under lease, from which the government receives an annual rental of \$76,802. As this area contains many great expanses of mountainous and forest lands, unsuitable for agriculture, only 62.0 per cent of it is reported as being included in the territory's 2,273 farms. Were statistics available showing the status of the land holdings at the time of the passage of the "Land act of 1895," a comparison of the same with the exhibit given in the above table would show that both the number and average size of farms operated by owners have been very materially increased during the intervening period. This movement has received much encouragement under the present land system, as the law provides five methods by which land may be acquired: They are: "Homestead lease," "right of purchase lease," "cash freehold," "special agreement," and "cash sales."

Of the 2,609,613 acres in farms, June 1, 1900, 1,759,981 acres, or 67.5 per cent, were owned by private individuals or by corporations, and 849,632 acres, or 32.5 per cent, by the government. Of the government land in farms, 782,400 acres, or 92.1 per cent, were included in the farms operated by the 128 managers—72.6 per cent in those of white managers, 11.9 per cent in those of Hawaiians, and 7.6 per cent in those of all others, mainly "Part Hawaiians." This leased area included some of the most productive cultivated land, as well as some of the most valuable grazing lands in the territory. White farmers controlled 78.5 per cent of the farm lands leased from the government, and 62.2 per cent of the lands leased from private persons.

FARMS CLASSIFIED BY RACE OF FARMER AND BY TENURE.

Tables 7 and 8 present the principal statistics for farms classified by race of farmer and by tenure.

TABLE 7.—NUMBER AND ACREAGE OF FARMS, AND VALUE OF FARM PROPERTY, JUNE 1, 1900, CLASSIFIED BY RACE OF FARMER, AND BY TENURE, WITH PERCENTAGES.

RACE OF FARMER, AND TENURE.	Number of farms.	NUMBER OF ACRES IN FARMS.			VALUE OF FARM PROPERTY.	
		Average.	Total.	Per cent.	Total.	Per cent.
The Territory.	2,273	1,148.1	2,609,613	100.0	\$74,084,988	100.0
White farmers.	509	4,000.9	2,082,277	79.8	68,238,547	92.1
Hawaiian farmers.	431	897.4	386,708	14.8	1,897,005	2.6
Part Hawaiian farmers.	57	1,762.5	100,464	3.9	527,269	0.7
Chinese farmers.	742	31.8	23,607	0.9	2,945,905	4.0
Japanese farmers.	531	31.0	16,476	0.6	473,248	0.6
South Sea Islander farmers.	1	8.0	8	(¹)	514	(¹)
Negro farmers.	2	6.5	13	(¹)	2,500	(¹)
Owners.	684	359.3	245,795	9.4	2,129,029	2.9
Part owners.	139	1,275.3	177,263	6.8	1,408,782	1.9
Managers.	123	16,778.4	2,147,635	82.3	67,640,613	91.5
Cash tenants.	1,255	29.7	37,296	1.4	2,427,272	3.3
Share tenants.	67	24.2	1,624	0.1	279,292	0.4

¹Less than one-tenth of 1 per cent.

TABLE 8.—AVERAGE VALUES OF SPECIFIED CLASSES OF FARM PROPERTY, AND AVERAGE VALUE OF PRODUCTS, WITH PER CENT OF GROSS INCOME ON TOTAL INVESTMENT IN FARM PROPERTY, CLASSIFIED BY RACE OF FARMER AND BY TENURE.

RACE OF FARMER, AND TENURE.	AVERAGE VALUES PER FARM OF—					Per cent of gross income on total investment in farm property.
	Farm property, June 1, 1900.				Gross income (value of all products of 1899).	
	Land and improvements (except buildings).	Buildings.	Implementments and machinery.	Live stock.		
The Territory	\$24,850	\$1,560	\$5,053	\$1,130	\$9,697	29.8
White farmers	102,032	6,043	22,343	3,676	38,528	28.7
Hawaiian farmers	3,153	353	27	868	680	15.7
Part Hawaiian farmers	5,961	752	72	2,465	1,152	12.5
Chinese farmers	3,331	338	116	215	2,470	62.2
Japanese farmers	740	85	19	47	440	49.4
South Sea Islander farmers	200	300		14	530	103.1
Negro farmers	700	625		25	855	28.4
Owners	2,266	398	39	410	652	20.9
Part owners	7,928	616	92	1,469	1,391	13.7
Managers	403,276	22,925	88,859	14,915	155,541	29.3
Cash tenants	1,575	179	52	130	1,087	56.2
Share tenants	3,556	376	91	146	1,916	46.0

The total value of the farm property of white operators constitutes 92.1 per cent of the total farm property of the territory. The average area of their farms is 2,328.4 acres in excess of that of the farms of the part Hawaiians, who have the next highest average. The Chinese farmers, 82.3 per cent of whom are tenants, operate less than one-sixteenth as much land as the Hawaiians, who rank second in the matter of total farm area, but the total value of their holdings, \$2,945,905, exceeds that of the Hawaiians by \$1,048,900. This total, however, is considerably in excess of the actual wealth of the Chinese farmers of Hawaii, as the value of the farm property of the 83 Chinese owners is but \$212,620.

The value of farm property belonging to the first of the six classes of farm operators, designated as "owners," is \$2,129,029, and constitutes 2.9 per cent of the value of all farm property. This amount is distributed among the several races as follows: White, \$1,404,940; Hawaiian, \$394,369; part Hawaiian, \$72,034; Chinese, \$212,620; Japanese, \$42,043; South Sea Islander, \$514; and negro, \$2,500. The value of the farms operated by individuals owning a part of the land and leasing the remainder, was \$1,408,782, or 1.9 per cent of the total value of all farms. The farms operated by salaried managers had an aggregate value of \$67,840,613, or 91.5 per cent of the grand total. The cash tenants operated farms with property worth \$2,427,272, or 3.3 per cent of all. The share tenants are the least important of the several classes, the value of their farm holdings being only \$279,292, or barely 0.4 per cent of the total.

The farms operated by managers contain 82.3 per cent of the total farm area; 60.5 per cent of this land is leased either from the government or from private individuals or corporations. The major portion consists of large tracts devoted to the cultivation of sugar and rice, and

vast areas utilized for grazing. A limited portion consists of small holdings operated by Chinese. The value of the land in the 128 managed farms is 10.9 times that of the remaining 2,145 farms. The managers expend 13.1 times as much for labor as all other farm operators combined, and secure products with a value 9.3 times as great.

FARMS CLASSIFIED BY AREA.

Tables 9 and 10 present the principal statistics for farms classified by area.

TABLE 9.—NUMBER AND ACREAGE OF FARMS, AND VALUE OF FARM PROPERTY, JUNE 1, 1900, CLASSIFIED BY AREA, WITH PERCENTAGES.

AREA.	Number of farms.	NUMBER OF ACRES IN FARMS.			VALUE OF FARM PROPERTY.	
		Average.	Total.	Per cent.	Total.	Per cent.
The Territory	2,273	1,148.1	2,609,613	100.0	\$74,084,988	100.0
Under 3 acres	492	1.6	788	(1)	281,631	0.4
3 to 9 acres	717	5.2	3,714	0.2	783,672	1.1
10 to 19 acres	371	13.5	4,998	0.2	679,024	0.9
20 to 49 acres	285	29.4	8,375	0.3	1,072,294	1.4
50 to 99 acres	129	66.6	8,586	0.3	832,200	1.1
100 to 174 acres	66	117.5	7,753	0.3	642,030	0.9
175 to 259 acres	35	214.6	7,511	0.3	599,443	0.8
260 to 499 acres	41	335.8	13,766	0.5	772,579	1.0
500 to 999 acres	21	677.8	14,233	0.6	566,937	0.8
1,000 acres and over	116	21,855.6	2,539,839	97.3	67,855,169	91.6

¹ Less than one-tenth of 1 per cent.

TABLE 10.—AVERAGE VALUES OF SPECIFIED CLASSES OF FARM PROPERTY, AND AVERAGE VALUE OF PRODUCTS, WITH PER CENT OF GROSS INCOME ON TOTAL INVESTMENT IN FARM PROPERTY, CLASSIFIED BY AREA.

AREA.	AVERAGE VALUES PER FARM OF—					Per cent of gross income on total investment in farm property.
	Farm property, June 1, 1900.				Gross income (value of all products of 1899).	
	Land and improvements (except buildings).	Buildings.	Implementments and machinery.	Live stock.		
The Territory	\$24,850	\$1,560	\$5,053	\$1,130	\$9,697	29.8
Under 3 acres	415	94	10	53	274	47.9
3 to 9 acres	833	157	21	82	554	50.7
10 to 19 acres	1,458	222	42	108	827	45.2
20 to 49 acres	3,018	388	118	238	2,073	55.1
50 to 99 acres	5,087	761	127	476	2,826	43.8
100 to 174 acres	3,127	788	320	493	3,606	30.9
175 to 259 acres	14,427	1,656	317	727	2,927	17.1
260 to 499 acres	14,084	1,468	2,311	981	6,950	30.9
500 to 999 acres	21,432	2,330	840	2,875	8,510	31.5
1,000 acres and over	444,449	24,799	97,106	18,604	167,948	28.7

The group of farms, each containing 1,000 acres or over, comprises by far the largest percentage of total farm area, and represents a correspondingly high percentage of the total value of farm property.

With slight variations the average values of the several forms of farm property, given in Table 9, advance as the farms increase in size.

It will be observed that the average value of buildings in no case exceeds that of land and improvements other than buildings. This relationship, particularly in the groups of smallest farms, is exceptional, and is accounted for by the

fact that most of the smaller farms consist of submerged rice and taro lands, on which there are few buildings other than structures for the storage of tools and implements.

The total value of farm property for farms containing from 20 to 49 acres is disproportionately high because of the large number of intensively cultivated rice, coffee, and taro farms included in this group.

The average gross incomes per acre for the various groups are as follows: Farms under 3 acres, \$171.23; 3 to 9 acres, \$106.89; 10 to 19 acres, \$61.36; 20 to 49 acres, \$70.56; 50 to 99 acres, \$42.45; 100 to 174 acres, \$25.62; 175 to 259 acres, \$13.64; 260 to 499 acres, \$20.70; 500 to 999 acres, \$12.56; and 1,000 acres and over, \$7.67.

FARMS CLASSIFIED BY PRINCIPAL SOURCE OF INCOME.

In Tables 11 and 12 farms are classified by principal source of income. If the value of the sugar cane raised on any farm exceeds that of any other crop and constitutes at least 40 per cent of the total value of all products, the farm is classified as a sugar farm. If rice is the leading crop, constituting 40 per cent of the value of the products, it is a rice farm. The farms of the other groups are classified in accordance with the same general principle. The "miscellaneous" farms reported are, for the most part, those whose operators do not derive 40 per cent of their income from any one class of farm products. Farms with no income reported for 1899 are classified according to the agricultural operations upon other farms in the immediate vicinity.

TABLE 11.—NUMBER AND ACREAGE OF FARMS, AND VALUE OF FARM PROPERTY, JUNE 1, 1900, CLASSIFIED BY PRINCIPAL SOURCE OF INCOME, WITH PERCENTAGES.

PRINCIPAL SOURCE OF INCOME.	Number of farms.	NUMBER OF ACRES IN FARMS.			VALUE OF FARM PROPERTY.	
		Average.	Total.	Per cent.	Total.	Per cent.
The Territory—	2,278	1,148.1	2,609,613	100.0	\$74,084,988	100.0
Taro—	441	42.9	18,922	0.7	562,499	0.8
Vegetables—	101	21.2	2,139	0.1	117,938	0.2
Fruit—	116	12.2	1,417	0.1	182,279	0.2
Live stock—	198	7,280.4	1,441,629	55.2	4,529,174	6.1
Dairy produce—	84	117.0	8,979	0.2	131,180	0.2
Tobacco—	22	1.5	38	(1)	16,415	(1)
Coffee—	512	137.1	70,218	2.7	1,932,915	2.6
Rice—	500	33.0	16,513	0.6	2,588,114	3.5
Sugar—	170	6,136.0	1,043,117	40.0	63,708,629	86.0
Miscellaneous—	179	65.6	11,746	0.4	315,845	0.4

¹ Less than one-tenth of 1 per cent.

TABLE 12.—AVERAGE VALUES OF SPECIFIED CLASSES OF FARM PROPERTY, AND AVERAGE VALUE OF PRODUCTS WITH PER CENT OF GROSS INCOME ON TOTAL INVESTMENT IN FARM PROPERTY, CLASSIFIED BY PRINCIPAL SOURCE OF INCOME.

PRINCIPAL SOURCE OF INCOME.	AVERAGE VALUES PER FARM OF—					Per cent of gross income on total investment in farm property.
	Farm property, June 1, 1900.					
	Land and improvements (except buildings).	Buildings.	Implements and machinery.	Live stock.	Gross income (value of all products of 1899).	
The Territory----	\$24,850	\$1,560	\$5,053	\$1,130	\$9,697	29.8
Taro-----	968	186	15	107	425	33.2
Vegetables-----	334	163	28	143	357	30.6
Fruit-----	1,181	223	27	140	491	31.2
Live stock-----	16,022	1,032	151	5,667	2,260	9.9
Dairy produce-----	1,889	478	43	1,448	1,108	23.7
Tobacco-----	683	58	1	4	225	30.2
Coffee-----	3,083	469	63	160	568	15.0
Rice-----	4,417	376	167	216	3,273	63.2
Sugar-----	285,549	16,104	66,583	6,521	113,306	30.0
Miscellaneous-----	1,416	190	31	127	452	25.6

For the several classes of farms the average values per acre of all products are as follows: For farms deriving their principal income from tobacco, \$150.00; rice, \$99.11; fruit, \$40.16; sugar, \$18.47; vegetables, \$16.87; taro, \$9.90; dairy produce, \$9.47; coffee, \$4.14; live stock, \$0.31; and miscellaneous, \$6.89. These averages are based upon the total acreage of the farms of each class and not upon the areas under cultivation, hence they must not be considered as indices of the comparative value of the various products.

The wide variations shown in the averages and in the percentages of gross income upon investment are due largely to the fact that in computing gross income no deduction is made for expenditures. For sugar plantations, rice farms, and taro farms, the average expenditure for such items as labor, fertilizers, irrigation, etc., represents a far greater percentage of the gross income than in the case of "live stock," "tobacco," or "miscellaneous" farms. Were it possible to present the average net income, the variations shown would be comparatively slight.

FARMS CLASSIFIED BY REPORTED VALUE OF TOTAL PRODUCTS.

Tables 13 and 14 present data relating to farms classified by reported value of all products in 1899.

TABLE 13.—NUMBER AND ACREAGE OF FARMS, AND VALUE OF FARM PROPERTY, JUNE 1, 1900, CLASSIFIED BY REPORTED VALUE OF ALL PRODUCTS OF 1899, WITH PERCENTAGES.

VALUE OF ALL PRODUCTS OF 1899.	Number of farms.	NUMBER OF ACRES IN FARMS.			VALUE OF FARM PROPERTY.	
		Average.	Total.	Per cent.	Total.	Per cent.
The Territory.	2, 273	1, 148.1	2, 609, 613	100. 0	\$74, 084, 988	100. 0
\$0	52	939.1	48, 833	1. 9	5, 219, 470	7. 1
\$1 to \$19	75	21. 8	1, 634	(1)	102, 120	0. 1
\$50 to \$99	144	13. 9	1, 998	0. 1	131, 190	0. 2
\$100 to \$249	533	23. 7	12, 634	0. 5	510, 630	0. 7
\$250 to \$499	477	21. 4	10, 193	0. 4	593, 610	0. 8
\$500 to \$999	402	96. 8	38, 906	1. 5	852, 490	1. 2
\$1, 000 to \$2, 499	299	253. 0	75, 648	2. 9	1, 723, 180	2. 3
\$2, 500 and over	291	8, 315. 4	2, 419, 767	92. 7	64, 892, 298	87. 6

¹ Less than one-tenth of 1 per cent.

TABLE 14.—AVERAGE VALUES OF SPECIFIED CLASSES OF FARM PROPERTY, AND AVERAGE VALUE OF PRODUCTS, WITH PER CENT OF GROSS INCOME ON TOTAL INVESTMENT IN FARM PROPERTY, CLASSIFIED BY REPORTED VALUE OF ALL PRODUCTS OF 1899.

GROSS VALUE OF ALL PRODUCTS OF 1899.	AVERAGE VALUES PER FARM OF—					Per cent of gross income on total investment in farm property.
	Farm property, June 1, 1900.				Gross income (value of all products of 1899).	
	Land and im- prove- ments (except build- ings).	Build- ings.	Imple- ments and ma- chinery.	Live stock.		
The Territory----	\$24,850	\$1,560	\$5,053	\$1,130	\$9,097	29.8
\$0.....	88,315	3,813	12,570	1,253	-----	-----
\$1 to \$19-----	1,219	109	6	28	31	2.8
\$50 to \$99-----	639	190	12	70	71	7.8
\$100 to \$249-----	749	170	12	83	160	16.7
\$250 to \$499-----	955	109	15	105	343	27.6
\$500 to \$999-----	1,581	270	42	228	608	31.5
\$1,000 to \$2,499-----	4,333	471	120	839	1,476	25.0
\$2,500 and over-----	169,012	9,936	36,986	7,064	72,386	32.5

There are 52 farms, ranging in area from 3 to 1,000 acres and over, which reported no income for 1899. There was expended for labor on these 52 farms in 1899, \$422,270, an average per farm of \$8,121. These figures indicate that the farms reporting no income in 1899 are, for the most part, of recent development. Among the number are two new sugar plantations, representing an area of many thousands of acres, on one of which \$328,819 was expended for labor alone. These facts account for the very high average acreages and values of the farms classed in Tables 13 and 14 as nonproducers. A few of the farms in this group, however, had been partially abandoned in 1899, while others had changed owners or tenants, and the persons in charge, June 1, 1900, were unable to give definite information concerning the products of the preceding year. To this extent the reports fall short of giving a complete exhibit of farm income in 1899.

LIVE STOCK.

The classification of live stock used in connection with the enumeration in Hawaii was that adopted by the Twelfth Census at the request of the various live-stock associations

of the country. The age grouping of neat cattle was determined by their present and prospective relations to the dairy industry and the supply of meat products. Horses and mules are classified by age, and neat cattle and sheep by age and sex.

Table 15 presents a summary of live-stock statistics.

TABLE 15.—NUMBER OF DOMESTIC ANIMALS, FOWLS, AND BEES ON FARMS, JUNE 1, 1900, WITH TOTAL AND AVERAGE VALUES.

LIVE STOCK.	Age in years.	ON FARMS. ¹		
		Number.	Value.	Average value.
Calves	Under 1	17, 517	\$85, 654	\$4. 89
Steers	1 and under 2	15, 075	140, 301	9. 31
Steers	2 and under 3	10, 319	122, 083	11. 83
Steers	3 and over	12, 640	223, 391	17. 67
Bulls	1 and over	830	29, 889	36. 01
Heifers	1 and under 2	9, 433	98, 621	10. 45
Cows kept for milk	2 and over	4, 028	127, 820	31. 73
Cows and heifers not kept for milk	2 and over	32, 918	457, 767	13. 89
Colts	Under 1	379	3, 238	8. 54
Horses	1 and under 2	1, 522	36, 489	23. 97
Horses	2 and over	11, 081	401, 934	36. 27
Mule colts	Under 1	69	1, 387	20. 10
Mules	1 and under 2	424	19, 775	46. 64
Mules	2 and over	6, 013	569, 345	94. 69
Asses and burros	All ages	1, 438	13, 355	9. 29
Lambs	Under 1	17, 492	11, 500	0. 66
Sheep (ewes)	1 and over	61, 646	87, 412	1. 42
Sheep (rams and wethers)	1 and over	22, 960	34, 971	1. 52
Swine	All ages	8, 057	49, 576	6. 15
Pigs	All ages	653	781	1. 12
Chinese buffaloes	All ages	80	7, 000	87. 50
Working bullocks	All ages	38	1, 240	32. 63
Fowls: ²				
Chickens		31, 333		
Turkeys		4, 672		
Geese		75		
Ducks		21, 508		
Bees (swarms of)		1, 387	8, 426	6. 07
Value of all live stock			2, 570, 142	

¹ No enumeration was taken of live stock not on farms or ranges in Hawaii.

² The number reported is of all fowls over 3 months old. The value is of all, old and young.

³ Including Guinea fowls.

The neat cattle of the territory are generally of an inferior grade. The comparatively high average value of dairy cows, \$31.73, is the result of the great demand for dairy produce, which has led the farmers to keep a better grade of cows than of other neat cattle.

Cattle raising is confined chiefly to the mountainous districts, where natural pasturage is abundant. Moreover, the horn fly has proven such a serious pest on the lands of lower altitude that the keeping of herds there is considered practically impossible.

The recent great development of the sugar industry has diminished the acreage used for grazing and has tended to check the increase in the number of neat cattle. This has not, however, proved injurious to the cattle-raising industry. Formerly the local consumption of beef was much less than the supply, many animals being slaughtered for their hides and tallow. Now, through the reduction of supply caused by the conversion of many acres of pasture land into cane fields, and the increased demand due to the rapid growth of population, not enough cattle are raised to supply the demand of local consumers, and all the animals raised find a ready market in the territory at high prices, despite the fact that they are of an inferior quality.

Only 25 farmers reported sheep on hand, June 1, 1900.

The number of these animals, however, was 84,606, showing an average of 3,384 for each farmer engaged in the sheep-raising industry. The island Niihau is almost wholly utilized in connection with sheep ranches, and some very good stock is kept, although the native sheep, as a rule, are inferior in quality.

The total number of horses exceeds that of mules, although on the larger plantations, especially those producing sugar, mules are being employed to an increasing extent as they are better adapted to the warm climate of the islands.

The prevailing conditions in Hawaii are not well suited to the raising of swine, although there is a good market for pork among the Chinese residents. Only 8,057 swine were reported.

The Chinese water buffalo is particularly well adapted to the work of cultivating the marshy rice fields, and nearly one hundred of these animals had been imported from China for that purpose prior to June 1, 1900. With the extension of the rice industry a much larger number will doubtless be employed.

ANIMAL PRODUCTS.

Table 16 presents a summarized exhibit of the animal products of agriculture.

TABLE 16.—QUANTITIES AND VALUES OF SPECIFIED ANIMAL PRODUCTS, AND VALUES OF POULTRY RAISED, ANIMALS SOLD, AND ANIMALS SLAUGHTERED ON FARMS, IN 1899.

PRODUCTS.	Unit of measure.	Quantity.	Value.
Wool.....	Pounds.....	424,238	\$53,686
Milk.....	Gallons.....	1594,120	
Butter.....	Pounds.....	118,871	91,876
Cheese.....	Pounds.....	12	
Eggs.....	Dozens.....	155,710	45,257
Poultry.....			61,546
Honey.....	Pounds.....	96,870	8,293
Wax.....	Pounds.....	1,720	298,476
Animals sold.....			64,081
Animals slaughtered.....			
Total.....			623,215

¹ Includes all milk produced.

The value of animal products in 1899 was \$623,215, or but 2.8 per cent of the value of all farm products. Of the above amount, 58.2 per cent represents the value of animals sold and slaughtered on farms; 17.1 per cent, that of poultry and eggs; 14.8 per cent, that of dairy products; 8.6 per cent, that of wool; and 1.3 per cent, that of honey and wax.

POULTRY AND EGGS.

The total receipts from products of the poultry industry in 1899 were \$106,808, of which amount 57.6 per cent represents the value of fowls raised during the year, and 42.4 per cent the value of the eggs produced.

DAIRY PRODUCE.

Although dairy produce finds a ready market at very high prices, dairying is carried on to a limited extent only. During the year 1899, the production of butter was but 0.8 of a pound per inhabitant, and that of milk was but 3.8 gallons.

Of the \$91,876 given in Table 16 as the value of all dairy products in 1899, \$31,522, or 34.3 per cent, represents the value of milk, butter, and cheese consumed on farms, and \$60,354, or 65.7 per cent, the amount realized from sales of such products. Of the latter sum, \$24,899 was derived from the sale of 84,451 gallons of milk, and \$35,455 from the sale of 96,209 pounds of butter. Of the total production of milk, 584,120 gallons, approximately 416,100 gallons were employed in the making of butter, 84,451 gallons were sold as milk, and the remainder, about 83,569 gallons, was consumed upon the 320 farms on which it was produced.

WOOL.

The raising of sheep is confined almost wholly to the islands of Hawaii, Lanai, Niihau, and Molokai, which reported 97.4 per cent of the total number of sheep on the islands, June 1, 1900, and 98.1 per cent of the total production of wool for the year 1899. Hawaii leads the other islands with an output of 187,925 pounds of wool, or 44.3 per cent of the total clip. The average weight per fleece, 4.53 pounds, and the low average value per pound, 12.7 cents, seem to indicate that the product is of an inferior grade.

HONEY AND WAX.

The island of Oahu reported 80.3 per cent of the total production of honey, and 50.0 per cent of the production of wax. Despite the fact that there were but 1,387 stands of bees reported, with a product aggregating only \$8,293 in value, the islanders exported most of their honey to the other islands of the Pacific and to the United States.

CROPS.

The acreages, quantities, and values of the crops of the territory in 1899, are given in the following table.

TABLE 17.—ACREAGES, QUANTITIES, AND VALUES OF THE PRINCIPAL CROPS IN 1899.

CROPS.	Aeres.	Unit of measure.	Quantity.	Value.
Sugar cane.....	65,687	Tons.....	2,239,376	\$729,481
a Cane sold.....		Tons.....	172,544	18,025,515
b Sugar made.....		Tons.....	252,283	8,000
c Molasses made.....		Gallons.....	285,661	1,502,051
Rice.....	9,130	Pounds.....	33,442,400	246,181
Coffee.....	16,451	Pounds.....	2,297,000	65,938
Cori.....	3,238	Bushels.....	115,909	
Sorghum and grasses cut green.....	19	Tons.....	271	803
Taro.....	1,279	Bags ²	3169,323	177,843
Tobacco.....	23	Pounds.....	50,410	5,101
Dry beans.....	26	Bushels.....	354	626
Dry peas.....	1	Bushels.....	56	100
Potatoes.....	166	Bushels.....	9,242	6,133
Sweet potatoes.....	135	Bushels.....	9,284	6,300
Onions.....	2	Bushels.....	140	202
Miscellaneous vegetables ¹	1124			45,727
Bananas.....	1356	Bunches.....	141,653	52,620
Pineapples.....	179	Number.....	116,560	9,160
Oranges.....	181	Boxes.....	3,363	6,714
Limes.....	16	Boxes.....	1,536	3,030
Alligator pears.....	18	Pounds.....	53,370	1,338
Other tropical fruits ³	139	Pounds.....	44,310	2,982
Grapes.....	15	Pounds.....	29,310	703
Small fruits.....	110	Quarts.....	10,420	1,120
Orchard fruits.....	133	Bushels.....	1,046	879
Peanuts.....	4	Bushels.....	848	715
Cocoanuts.....	12	Number.....	8,350	230
Forest products.....				125,094
Miscellaneous.....				332,870
Total.....	86,854			21,417,516

¹ Estimated from number of trees, plants, and vines.

² Average weight of bag of taro, 100 pounds.

³ Including 70 bags lin gau (Chinese taro) and 26 bags imo (Japanese taro).

⁴ Including cabbages, muskmelons, radishes, turnips, watermelons, etc.

⁵ Including figs, guava, strawberries, lemons, loquats, mangoes, tamarinds, etc.

Of the 86,854 acres of cultivated land, 65,687, or 75.6 per cent, were used for growing sugar cane; 9,130, or 10.5 per cent, for rice; 6,451, or 7.4 per cent, for coffee; 3,238, or 3.7 per cent, for corn; 1,279, or 1.5 per cent, for taro; and 1,069, or 1.3 per cent, for all other crops, including fruit and vegetables.

SUGAR.

The value of all cane sold and of all sugar and molasses made on plantations from cane grown thereon was \$18,762,996, or 87.6 per cent of the total value of all crops reported. This percentage reflects the relative importance of the sugar industry in the agriculture of Hawaii, and represents approximately the relative number of persons employed in that industry as compared with the total number engaged in agriculture.

NUMBER AND CHARACTER OF THE FARMS RAISING SUGAR CANE.

Table 18 gives the number of farms and total acreage devoted to the growing of sugar cane, with total yield in tons.

TABLE 18.—NUMBER OF FARMS, TOTAL ACREAGE, AND AMOUNT OF SUGAR CANE PRODUCED IN 1899, BY ISLANDS.

ISLANDS.	Number of farms growing cane.	Total number of acres planted to cane.	Total production of cane in tons.
The Territory.....	184	65,687	2,239,376
Hawaii.....	152	35,096	983,053
Kauai.....	13	12,917	487,198
Maua.....	10	10,531	393,383
Oahu.....	8	6,910	366,742
Lanai.....	1	200	14,000

¹ Estimated. Crop not matured December 31, 1899.

Although the acreage devoted to sugar cane constitutes three-fourths of the total area of cultivated land and contributes over four-fifths of the value of all crops, the number of farms whose operators are engaged in growing cane is only 184, or but 8.1 per cent of the farms in the territory. Of these 184 farms or plantations, the operators of 170 made the growing of cane, either with or without the reduction of the same to sugar, the principal source of their farm income, while 14 cultivated small tracts incidental to their other farming operations and sold the product. Sugar and molasses were manufactured by the operators of 42 plantations, 30 of whom used only the cane grown on their own lands, while 12 purchased a part of the cane; 4 large plantations, on which extensive plants for making sugar had been erected or were in the process of erection, had been in operation so short a time that no cane had been sold nor sugar manufactured prior to June 1, 1900; on the remaining 124 plantations the crop was sold as cane. There were 2 sugar establishments which were unconnected with plantations and therefore purchased all the cane used.

The 138 planters, who grew cane and sold the same to other planters or to the independent sugar houses, reported the sale in 1899 of 172,544 tons of cane, an average of

1,250 tons per farm, while the operators of the 46 other plantations cut a total of 2,066,832 tons, or an average of 44,931 tons per farm.

VALUE AND INCOME OF SUGAR PLANTATIONS.

The 170 farms or plantations, whose operators made the sugar industry their principal source of income, constituted only 7.5 per cent of all the farms in the territory, but contained 1,043,117 acres of land, or 40.0 per cent of all farm land. Their lands and improvements, aside from buildings, had a value of \$48,543,391, and their buildings were valued at \$2,737,685. The aggregate value of their implements and machinery, including steam plows, locomotives, railroads and cars for hauling cane, engines and pumps for irrigation, machinery for grinding cane and making sugar, and other similar apparatus, was \$11,310,020, and the total value of their live stock, \$1,108,533, making the total fixed agricultural capital invested in these 170 plantations, \$63,708,020, or 86.0 per cent of all agricultural capital in the territory. The gross value of the products of these plantations, including sugar made on plantations from cane grown thereon, but exclusive of sugar made from cane purchased by one planter from another, was \$19,262,031, an amount equal to 30.2 per cent of their fixed capital. The expenditure for labor, including all salaries and wages, was \$6,971,896, and that for fertilizers was \$1,326,407. These two items of expense, which were the only ones obtained from sugar farms, equalled 43.1 per cent of the gross income of such farms.

VALUE AND INCOME OF 46 LARGE PLANTATIONS.

For the 46 plantations with facilities for manufacturing sugar, additional reports were secured which throw much light upon the industry. These plantations controlled 894,289 acres of land, worth, with buildings and improvements, \$51,250,210; implements and machinery worth \$11,019,872; and live stock valued at \$953,376, making a total fixed capital of \$63,223,458. In connection with the agricultural operations outside of sugarhouses, they expended in 1899, for labor, including salaries, \$4,743,256; for fertilizers, \$1,209,130; for fuel used in running the irrigation pumps, steam plows, and locomotives, and in carrying on kindred field operations, \$681,186; for feed purchased, \$486,808; and for the maintenance and repair of irrigation works, \$827,932. The total, \$7,948,312, includes all the reported expenditures outside of the sugarhouses. Unreported expenses are the rentals paid for the 457,492 acres of land leased from the government, and the 142,449 acres leased from private persons or corporations; the expenditures for maintaining and repairing machinery, appliances, and buildings in use, outside of the sugarhouses, and the taxes on land owned. These expenses, together with the \$7,948,312 given above, are probably sufficient to nearly, if not quite, equal the amount, \$9,580,495, which the sugarhouses returned on the manufacturers' schedules as the cost of the 2,226,307 tons of cane which they converted into sugar. The average cost of raising a ton of cane and delivering it to the factory may, therefore, be said to have been \$4.30.

The expenditures connected with the operation of the sugarhouses on these 46 plantations, as distinct from their other agricultural operations, are tabulated with those of the 2 establishments making sugar but not growing cane. These 2 establishments are so small, comparatively, that their inclusion does not materially affect the totals. In 1899 the expenditure of the 48 sugarhouses for labor, including salaries, was \$1,111,776; for fuel, \$57,524; for mill supplies, \$181,620; for freight charges, \$58,283; for taxes and insurance on sugarhouses and contents, \$79,455; for interest, repairs, and miscellaneous expenses connected with the operation of the sugarhouses, \$541,273; for cane purchased from outside plantations, \$671,445; and for all other material, \$551,854.

The total expense of operating sugarhouses, exclusive of the amount paid for cane purchased, was \$2,581,790, or an average of \$1.16 for each ton of cane converted into sugar. This makes the total cost of raising a ton of cane and converting it into sugar, \$5.46, of which amount the cost of the sugarhouse operations represents a little less than one-fourth. On the other hand, the fixed capital connected with the sugarhouses is \$8,654,476, which represents a little less than one-seventh of the total amount invested in the industry. The average value of the sugar produced from a ton of cane was \$8.60, leaving a margin of \$3.14 per ton of cane to cover interest on investment, and renewals of buildings, implements, machinery, etc. After making liberal allowances for these items the figures show a net profit that is realized in but few industries.

The value of the 46 sugarhouses, which are located on plantations, together with that of their products, is included in the statistics of the agricultural wealth of Hawaii as reported by this division of the Census Office. Their operations are incidental to the growing of cane on the plantation and their output is included with the total farm products. Since these houses are engaged in the manufacture of raw sugar, their capital and output are also included in the report of the division of manufactures. To this extent the statistics collected by the two divisions involves a duplication, which will be taken into account in the final reports of the Twelfth Census.

PLANT AND RATTOON CANE.

In 1899 the 46 plantations, equipped with machinery for making sugar, cultivated 60,168 acres of cane, or 91.6 per cent of the total acreage, of which 35,282 acres were plant-cane, 24,746 acres first-year ratoon, and 140 acres second-year ratoon. Only a very limited quantity of second-year ratoon cane is grown, the planters finding it more profitable, as a rule, to re-seed their land after two crops.

From these 60,168 acres 2,036,832 tons of cane were harvested, of which 1,389,152 tons were plant-cane; 675,595 tons, first-year ratoon; and 2,085 tons, second-year ratoon. No cane was reported as kept for seed, as the planters of Hawaii use the tops for this purpose, and thus avoid the large expense for seed necessary in the southern part of the United States.

The average quantity of cane cut for sugar making from each acre harvested was 34.4 tons, ranging from 28.0 tons in Hawaii to 53.0 tons in Oahu. In the former island cane is grown without irrigation, while in the latter the fields are irrigated, hence the great difference in average yield.

SUGAR AND MOLASSES PRODUCED.

The 46 plantations which grew cane and made sugar in 1899, together with the two independent sugarhouses, reported the purchase of 159,475 tons of cane, for which they paid \$671,445. The 138 farmers from whom this cane was purchased reported the sale of 172,544 tons, for which they received \$729,481. The variations in the two sets of reports, amounting to 13,069 tons of cane, with a value of \$58,036, are due to the following facts: The business year of some of the planters who purchased cane does not coincide with the calendar year, which is commonly used by the small planters in making their reports; in addition, the reported quantity and value of cane sold includes estimates of the cane harvested on certain newly established plantations whose crops were not fully matured on December 31, 1899.

The total sugar output of the Hawaiian Islands in 1899 was 271,049 tons, or 542,098,500 pounds, consisting of 406,254,500 pounds of what is known to the trade as "firsts," 75,310,000 pounds of "seconds," and 584,000 pounds of "thirds." The total value of the product was \$19,254,773. This was the greatest crop in the history of the islands. From data secured by the representatives of the Twelfth Census the product of 1898 is estimated to have been 225,548 tons, or 45,501 tons less than the crop of 1899.

The total quantity of molasses reported as having been produced in the sugar mills of the islands in 1899 was 4,987,661 gallons, of which but 285,661 gallons, valued at \$8,000, was disposed of by sale. The remainder was either used as fertilizer or fed to stock.

As a result of the progress made in the sugar industry during the past quarter of a century, Hawaii now ranks third among the sugar-producing countries of the world. Java and Cuba each produce more sugar than does Hawaii, but on neither of these islands does the average yield per acre equal that in Hawaii, where yields of from 60 to 70 tons of plant cane per acre, and of 30 to 50 tons of ratoon cane, are common. The percentage of saccharine content in Hawaiian cane is also very high, an average of but 8.21 tons of cane having been required in 1899 for the production of 1 ton of sugar. The average production of sugar from an acre of cane was 4.13 tons, but in many localities yields of 8, 10, and even 14 tons per acre are reported.

The methods employed in cane cultivation are more advanced in Hawaii than in any other of the world's sugar-producing centers. Steam and gang plows are in general use, and on plantations where the rainfall is insufficient costly pumping plants have been erected. One of these pumping stations on the island of Oahu represents an outlay of \$1,750,000. The most modern systems have like-

wise been introduced for the reduction of cane, and very recently some of the mills have installed crushing apparatus and other machinery of the most improved type, in order to secure a slightly increased degree of extraction over that possible with the equipment formerly used. Cane is generally taken from the fields to the mills by means of private railroads or a system of flumes. In Hawaii, the refuse cane, or bagasse, furnishes sufficient fuel to operate the sugar mills. The importance of this item as a factor in the success of the industry becomes evident, when it is known that in Louisiana, where considerably less sugar was produced, fuel to the value of \$644,655 was burned in 1899 in addition to the bagasse used. This advantage, combined with the superior climatic and soil conditions, make the sugar-raising areas of Hawaii the most remunerative in the world.

CEREALS AND MISCELLANEOUS CROPS.

The cultivation of rice is carried on most extensively on the island of Oahu, where 20,998,600 pounds, or 62.8 per cent of the total crop of 1899, were grown. The island of Kauai produced 90.8 per cent of the remainder of the crop. The average yield per acre in 1899 was 3,662.9 pounds, and the average values, 4.7 cents per pound and \$171.09 per acre. On the island of Oahu the average yield per acre was 4,087.7 pounds, while individual yields ran considerably above that figure. These high average yields result from the fact that the uniformly warm climate of the territory permits two crops to be grown on the same land in a twelvemonth. The industry is almost wholly in the hands of the Chinese, who, for the most part, use the crudest of implements and employ the most laborious methods. Although a considerable quantity is exported, the major portion is consumed on the islands, being in great demand in the populous Chinese districts.

The only other cereal raised to any extent is corn. The acreage devoted to this crop in 1899 was 15.3 per cent of the total cultivated area exclusive of that planted in sugar cane. The average yield per acre was 35.8 bushels, and the average values, 56.9 cents per bushel and \$20.36 per acre. Attempts to introduce other grains have met with slight success.

Tobacco is the most important of the minor crops grown in the territory. The 23 acres devoted to this crop in 1899 produced 50,410 pounds, or an average yield per acre of 2,191.7 pounds. The total value of the crop, which brought an average price of 10.1 cents per pound, was \$5,101, or an average return per acre of \$221.78. Almost the entire crop is grown on the island of Hawaii, and consists of a coarse, dark, excessively strong variety, although attempts at growing improved grades indicate that the industry might be greatly developed.

Systematic methods for the cultivation of forage crops have not been generally adopted among stock raisers. In a few cases alfalfa, sorghum, etc., are grown for forage purposes, but only to a very limited extent, as is shown in the report of "sorghum and grasses" in Table 17. Many rich

grasses grow readily on the islands, but owing to the frequent rains the crop is generally spoiled in the curing process.

COFFEE.

The production of coffee in 1899 was the largest in the history of the islands. From 6,451 acres of land, on which were 3,225,743 bearing trees, a product of 2,297,000 pounds was secured. The number of trees here given includes a great many young trees which had just come into bearing and yielded only a small crop. Consequently the average yield per tree for the census year, 0.7 of a pound, represents little more than half the producing capacity of fully matured trees. The average production per acre was 356.1 pounds, while the average values were 10.7 cents per pound and \$38.16 per acre. Of the total production, 2,112,650 pounds were grown on the island of Hawaii; 69,800 pounds on Maui; 68,100 pounds on Oahu; 42,750 pounds on Kauai; and 3,700 pounds on Molokai.

VEGETABLES.

Although some districts of the islands are adapted to the cultivation of almost every known vegetable, very little is done in the way of diversified truck farming. The Chinese at present control the local production of vegetables, which is not sufficient for the local demands, the rest of the necessary supply being obtained by importations, mainly from California. The production of taro, the great native food, is extensively carried on. In the islands of Hawaii, Kauai, Maui, Molokai, and Oahu, there were in 1899, 559 farmers engaged in the cultivation of this tuber. In the production of the 169,323 bags which constituted the output for that year, they made use of 1,279 acres of land. Oahu leads in production, and it is there also that the consumption of the raw and manufactured product is greatest. The average yield per acre in 1899 was 132.5 bags, and the average price, \$1.05 per bag. The value of the crop constituted 75.3 per cent of the value of all vegetables.

Second in importance, among the vegetables, are sweet potatoes and Irish potatoes. Of the former there were grown in 1899, 9,284 bushels, valued at 69 cents per bushel, and of the latter 9,242 bushels, valued at 66 cents per bushel. The average yield and average value per acre of all potatoes were 61.5 bushels and \$41.50, respectively.

FRUIT.

Although the growing of many of the tropical and sub-tropical fruits, to which the soil and climate of Hawaii are adapted, has not as yet been carried beyond the experimental stage, considerable progress in the cultivation of some of these fruits has been made in recent years. The banana, pineapple, and orange have become of commercial importance, although the total value of the three products in 1899 was but \$63,494. While 205 of the 351 banana growers of the territory are located on the island of Hawaii, Oahu practically monopolizes the industry, having produced in 1899, 81.2 per cent of the entire output. Hawaii ranks second; Kauai, third; Maui, fourth; and Molokai, fifth. The average value in 1899 was 37.1 cents

per bunch, but the best grades bring much higher prices in the retail market.

Oahu leads also in the production of pineapples, 84,310, or 72.3 per cent of the total number reported, having been grown in close proximity to Honolulu. The average yield per acre was 1,475.4, and the average value 7.9 cents each.

Although the raising of oranges has proven successful very little has been done toward advancing this particular branch of agriculture. The crop of 1899 was 3,368 boxes, of which 2,863 boxes, or 85.0 per cent, were grown on the island of Hawaii. The growing of oranges should, in time, develop into a highly remunerative industry, as the average return per acre from the crop of 1899 was \$216.58.

The total area used in growing small fruits was but 10 acres, and the value of the fruit produced, \$1,120. The crop of 1899 consisted entirely of strawberries, 97.1 per cent being produced on the island of Oahu.

Of the other fruits grown on the islands, limes, alligator pears, peaches, lemons, loquats, guavas, and mangoes yield the greatest returns. Table 10, which contains a classified list of nonbearing trees, gives an idea of the progress being made in the cultivation of each of these fruits.

NONBEARING TREES, VINES, AND PLANTS.

The following table gives a classified list of the non-bearing fruit trees and plants of Hawaii by islands.

TABLE 19.—NUMBER OF NONBEARING TREES, VINES, AND PLANTS IN 1899.

ISLANDS.	Total.	Coffee.	Banana. ¹	Orange.	Lime.	Lemon.	Pine-apple. ¹	Alligator pear.	Fig.	Peach.	Mango.	Cocoanut.	Miscellaneous. ²
The Territory	1,653,077	1,444,634	55,131	4,575	6,678	700	130,074	3,198	1,099	2,988	426	535	3,009
Hawaii	1,347,367	1,288,858	33,002	2,910	2,436	667	9,814	2,688	898	2,821	224	255	2,791
Kauai	53,684	47,981	3,771	944	112	11	640	130	19	50	2	18	6
Mani	101,161	68,200	4,790	13	71	7	38,000	15	11	40		14	
Molokai	1,250	1,200	50										
Oahu	149,615	48,395	13,518	708	4,059	15	81,620	365	171	77	200	248	239

¹Bananas and pineapples generally come into fruiting within a year; those reported here are the plants on new plantations which had not matured during the year 1899.

²Including apples, breadfruit, citron, guava strawberries, litchi nut, loquat, papai, pears, pomeloes, olives, rose apples, tamarinds, and grape vines.

The figures shown in the above tabulation represent, for the most part, the number of newly planted trees, rather than mature trees which were barren in 1899. They are, therefore, of importance as an index of the recent growth of the fruit-raising industry.

Of the 1,653,077 nonbearing trees on the islands in 1899, 1,444,634, or 87.4 per cent, were coffee trees which had not reached maturity at the close of the census year. Of this latter number 89.2 per cent were on the island of Hawaii, which reports also 87.7 per cent of the bearing coffee trees. A product of 2,297,000 pounds of coffee was secured in 1899 from 3,225,743 trees. If the trees which were not yet in bearing in 1899 prove equally productive, the coffee crop will be increased 44.8 per cent in the near future. Coffee is best grown at an altitude just above that at which sugar cane can be raised most remuneratively, and on a few plantations the cultivation of both these crops is carried on simultaneously with great success.

Second in importance among nonbearing trees and plants are pineapples. The total number, 130,074, exceeds by 10,555 the number of plants in bearing in 1899, indicating the rapid growth which this industry is experiencing.

For the other fruits the ratios between the numbers of nonbearing and bearing trees are as follows: The number of nonbearing banana plants is equal to 35.3 per cent of the number of bearing plants; oranges, 209.1 per cent; limes, 280.1 per cent; lemons, 489.5 per cent; alligator pears, 570.1 per cent; figs, 136.5 per cent; peaches, 105.6 per cent; cocoanuts, 209.8 per cent.

FOREST PRODUCTS.

The term "forest products" as employed here includes all of the cord wood, logs, railroad ties, fence posts, bark,

resin, and similar materials cut or produced on farms. The value of such products in 1899 was \$125,094, reported by 172 farmers, most of whom were on the islands of Hawaii, Kauai, Mani, and Oahu. The wooded sections of the islands contain many valuable hard woods and large timber, suitable for bridge construction and shipbuilding. Considerable wood is cut for fuel.

Attention is being directed to the reforestation of the islands, and in the vicinity of Honolulu much progress has already been made. The islanders are, furthermore, taking steps to protect the woodlands from the ravages of roaming cattle.

LABOR AND FERTILIZERS.

The total expenditure for labor on farms in 1899 was \$7,913,166, an average of \$3,481 per farm. The average was highest on the sugar plantations, where \$6,971,896, or 88.1 per cent of the total amount was expended. The average expenditures per farm for the several classes of farms were as follows: Sugar plantations, \$41,011; live-stock farms, \$1,042; rice farms, \$951; coffee plantations, \$360; dairy farms, \$206; fruit farms, \$148; vegetable farms, \$96; taro farms, \$51; tobacco farms, \$46; and miscellaneous farms, \$101. "Managers" expended on an average, \$57,442; "part owners," \$489; "share tenants," \$384; "cash tenants," \$282; and "owners," \$166. White farmers expended \$14,312 per farm; Chinese farmers, \$682; part Hawaiian farmers, \$327; Japanese farmers, \$113; and Hawaiian farmers, \$102.

Relative expenditure is made a little clearer by reducing the averages to the basis of the acre. If that is done tobacco farms are found to lead with an expenditure per acre for labor, of \$30.66. Rice farms show an expenditure of

\$28.81 per acre; fruit farms, \$12.13; sugar farms, \$6.70; vegetable farms, \$4.53; coffee farms, \$2.63; dairy farms, \$1.76; miscellaneous, \$1.54; taro, \$1.19; while live-stock farms show by far the lowest expenditure per acre, \$0.14.

Of the operators of farms classified by tenure, share tenants expended the largest amount per acre, \$15.87, cash tenants following with \$9.49. Managers expended \$3.42; owners, \$0.46; and part owners, \$0.38.

Of operators classified by race, Chinese farmers expended \$21.45 for labor per acre; white farmers, \$3.49; Japanese, \$3.65; part Hawaiian, \$0.19; and Hawaiian, \$0.11.

On June 1, 1900, the operators of the 46 leading sugar plantations had in their employ 34,294 persons, of whom 34,016 were adult males and 278 were women and children. The nationalities of the former were reported in detail as follows: Japanese, 24,112; Chinese, 5,704; white, 3,055; Hawaiian, 988; part Hawaiian, 109; negro, 6; and other races, 42. Of the whites, 1,753 were Portuguese; 785, natives of European countries other than Portugal; and 517, natives of America.

IRRIGATION STATISTICS.

The topographical features of the territory, which are described elsewhere, have a marked influence upon the development of agriculture. The islands are all of volcanic origin, and their rocks consist almost exclusively of dark, basaltic lava, more or less porous in structure. The islands are built up of a great number of lava-flows, which, as they were not continuous or regular, over large areas are of varying thickness, and cause the marked irregularity of profiles presented everywhere. Where the slopes are less steep and the lava has disintegrated, the aspect is much softened by the growth of grass and timber. Elsewhere the mountain sides are deeply scored with canyons, crevasses, and fissures. The large cultivated areas are located on the lower levels, generally between the bases of the mountains and the sea.

The annual rainfall ranges from 42 inches on the island of Oahu, to 120 inches on Hawaii, but extreme variations are frequently recorded within comparatively narrow limits. On the island of Oahu, which contains only 600 square miles, the annual rainfall often varies from 19 inches at Honolulu to 108 inches in Nuuanu Valley, and on the leeward and windward sides of Hawaii the difference is even greater. This great range of precipitation within small areas is due to the fact that the prevailing winds are the moisture laden northeast trade winds. On striking the high altitudes of the islands these winds are deflected and occasion heavy rainfalls and lower temperatures on the windward or eastern sides. The precipitation is greatest on the higher slopes and decreases towards the sea level, instances being reported where the rainfall on one part of a plantation is ample, while on the same plantation, at a lower altitude, it was quite insufficient for the production of any crop.

Irrigation is an exceedingly important factor in the

The labor problem is one of the most serious connected with the sugar industry in Hawaii. Until recently the great majority of the laborers employed upon the plantations have been Japanese or Chinese. Since the act of Congress of July 7, 1898, authorizing the annexation of Hawaii as a territorial part of the United States, became operative, thus bringing the Chinese Exclusion Act into force, there has been practically no immigration of unskilled labor. The cessation of labor importation, resulting from the enforcement of this statute, together with the fact that many of the alien laborers have returned to their native lands, has caused a reduction in the relative number of plantation workers, even though wages are continually being advanced.

Fertilizers purchased in 1899 cost \$1,352,847, an average of \$595 per farm. As with labor, the bulk of the expenditure for fertilizers was made on the sugar plantations, the average per farm being \$7,802. For rice farms the average was \$33; for coffee plantations, \$11; for taro farms, \$5; for fruit farms, \$4; for vegetable farms, \$3; for live-stock farms, \$1; and for miscellaneous farms, \$6.

agriculture of all the islands except Hawaii, and although its practice on an extensive scale dates back only to the time when the white planter began to dominate agriculture, it has already transformed the islands. Where irrigation has been introduced on the windward sides the water supply has been taken from streams by means of gravity canals and ditches; and reservoirs, many of them of large capacity, have been constructed to conserve the waters during the rainy season. The most important irrigation systems, however, are located on the leeward sides, where the water supply is obtained from artesian wells.

Owing to the peculiar topography of the islands, the exceeding porosity of the soil, and the absence of large streams, irrigation, for the most part, is very expensive. It necessitates the boring of many artesian wells, the construction of large and powerful pumping plants, and of costly flumes and ditches. In addition, the salaries of the skilled engineers and other employees in charge of the water supply, contribute to swell the cost of irrigation far beyond that entailed upon the farmers of the arid West. Notwithstanding these obstacles, the extension of irrigation has been along the most improved and scientific lines, and the rewards which have followed have been most gratifying.

The Hawaiian sugar plantations are the most productive in the world, and their irrigation plants are among the most modern and expensive constructed by private capital. Some conception of the difficulties which the planters have surmounted may be obtained from a brief description of one of the great engineering feats recently accomplished on the island of Maui. A canal was dug along the slopes of the great crater Haleakala, and a large stream of water was brought a distance of 22 miles, and distributed through laterals over the plantation. Along

the route of the canal, scores of gulches and canyons are crossed and a dozen or more high ridges are penetrated by tunnels, some of them nearly half a mile in length. One of the gulches, situated on the side of a vast crater, is 350 feet deep and nearly a quarter of a mile wide, with perpendicular sides. The pipe lines used in crossing it were not placed on trestles, but the less expensive and more stable method was followed of dropping them into the gulch, thus forming an inverted siphon which proved a success from the start.

The following tables present the principal statistics of irrigation.

TABLE 20.—NUMBER OF IRRIGATED FARMS, COMPARED WITH TOTAL NUMBER OF FARMS, AND IRRIGATED ACREAGE COMPARED WITH TOTAL IMPROVED ACREAGE, JUNE 1, 1900.

ISLANDS.	NUMBER OF FARMS.			NUMBER OF CULTIVATED ACRES IN FARMS.		
	Total.	Irrigated.	Per cent irrigated.	Total.	Irrigated.	Per cent irrigated.
The Territory	2,273	667	42.1	86,878	88,994	44.9
Hawaii	354	36	8.8	42,363	1,205	2.8
Kauai	398	342	85.7	16,893	16,798	99.4
Lanai	2	1	50.0	200	230	100.0
Maui	389	142	37.1	14,190	8,976	63.3
Molokai	27	13	48.1	126	46	36.5
Niihau	1					
Oahu	507	423	83.4	18,166	11,769	64.8

TABLE 21.—ACREAGE AND LAND VALUES OF IRRIGATED FARMS COMPARED WITH ACREAGE AND LAND VALUES OF ALL FARMS, BY ISLANDS.

ISLANDS.	TOTAL AREA.			LAND VALUES.		
	All farms.	Irrigated farms.	Per cent irrigated.	All farms.	Irrigated farms.	Per cent irrigated.
The Territory	2,609,613	724,603	27.8	\$56,484,064	\$36,279,110	62.5
Hawaii	1,747,213	338,234	19.4	16,495,479	2,319,850	13.5
Kauai	286,273	176,215	74.6	11,552,710	11,895,210	98.7
Lanai	94,909	4,900	5.2	692,600	195,000	28.2
Maui	240,015	108,178	45.1	14,408,700	10,650,400	72.6
Molokai	107,873	5,521	5.1	811,780	29,350	3.6
Niihau	40,000			45,000		
Oahu	123,270	91,531	74.2	12,887,901	10,920,210	84.7

The average size of all farms is 1,148 acres and of irrigated farms, 757 acres. The average area of cultivated land actually irrigated, however, is but 41 acres, or 5.4 per cent of the average area of farms on which irrigation is used. Exclusive of buildings, the land of unirrigated farms has an average value of \$11.25, while for irrigated farms the average is \$48.69 per acre.

Table 22 is a comparative exhibit by islands of the total acreages and the acreages irrigated for each of the principal crops.

TABLE 22.—ACREAGE AND VALUE OF PRINCIPAL IRRIGATED CROPS: 1899.

CROPS.	ACREAGE.			VALUE OF CROPS.	
	Total.	Irrigated.	Per cent irrigated.	Total.	Irrigated.
Sugar cane	65,657	23,483	43.4	\$18,762,996	\$10,940,061
Rice	9,130	9,130	100.0	1,552,051	1,552,051
Coffee	6,461	64	1.0	246,181	4,995
Corn	8,238	1	(*)	55,998	
Sorghum and grasses cut green	19			808	
Taro	1,279	910	71.2	177,813	146,681
Tobacco	23			5,101	
Dry beans	26			626	
Dry peas	1	1	100.0	100	100
Potatoes	169	5	3.0	6,193	849
Sweet potatoes	135	34	25.2	6,360	1,782
Onions	2	(*)	(*)	202	2
Miscellaneous vegetables	24	40	45.4	445,727	581,228
Bananas	356	223	63.5	52,620	48,345
Pineapples	73	47	53.5	6,160	6,498
Oranges	31			6,714	
Limes	0	5	83.3	3,060	2,600
Alligator pears	8	2	25.0	1,338	800
Cocoanuts	2			230	
Other tropical fruits	30	5	12.8	2,982	703
Small fruits	10	10	100.0	1,120	1,000
Grapes	5			703	
Orchard fruits	33			879	
Peanuts	4			715	
Total	86,851	33,997	44.9	20,959,552	12,751,099

* Includes cane sold and sugar and molasses made.

† Less than one-tenth of 1 per cent.

‡ Less than 1 acre.

§ Includes \$21,965 produced on duplicate acreage.

¶ Includes \$18,755 produced on duplicate acreage.

In addition to the values given above, there were \$125,024 worth of forest products, and \$332,870 worth of miscellaneous crops for which no acreages were given. The irrigated area given is exclusive of 1,445 acres in two farms on the island of Oahu, for which no crops or values were reported.

Exclusive of forest products and miscellaneous products, for which no acreage was reported, the average value per acre of the products of unirrigated land in 1899 was \$171.52, while the products of irrigated land had an average value per acre of \$327. For each of the islands, the values per acre of the products of unirrigated and irrigated lands, respectively, are as follows: Hawaii, \$188.91 and \$271.87; Kauai, \$81.57 and \$234.42; Maui, \$88.86 and \$392.47; Molokai, \$76.44 and \$172.50; and Oahu, \$121.16 and \$348.35. No crops were grown in 1899 on the island of Niihau, and the only crop reported on Lanai was 200 acres of sugar cane, all of which was irrigated. This cane had not matured at the time of the enumeration, but an estimated value of \$80 per acre is given.